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Home and Farm Preparation of Pickles

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HOME AND FARM PREPARATION OF PICKLES

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Requests for information on the home pickling of fruits and vegetables are received at the Agricultural Experiment Station with increasing frequency. This circular describes suitable methods of pickling and discusses the principles involved. An understanding of these principles is necessary to properly carry out the methods described. The recipes given are designed for home and farm use only and are not suitable for commercial use.

GENERAL PRINCIPLES OF PICKLING

The term pickling as used in this circular denotes the preservation of food in brine or vinegar either with or without bacterial fermentation.

An object of pickling in addition to that of preservation is the attainment of the color, flavor and texture which should characterize pickled food products.

Causes of Spoiling and Fermentation.—The spoiling of fruits and vegetables is not due directly to the action of air or of heat and is not simply a chemical or physical change. When vegetable materials ferment, decay, or turn sour, it is because of the growth of certain microscopic living organisms, or "germs." These all belong to the vegetable kingdom and are divided into three groups: molds, yeasts and bacteria. Familiar examples of each group respectively are the blue-green molds of spoiled fruits; the yeast used in bread making; and the bacteria of the scum or "mother" of vinegar. What we see in compressed yeast, for instance, is simply a mass consisting of billions of individual yeast cells. Individual mold, yeast and bacterial cells are too minute to be seen without a microscope. Their activities cause the molding of jellies, the swelling and souring of canned fruits, the spoiling of canned vegetables and the putrefying of meats as well as the fermentation of vegetable pickles. The character of the material largely determines which type of change will occur. Acidity

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is favorable to yeasts and molds. Fruits may therefore spoil by yeast fermentation or become moldy. Most putrefactive bacteria prefer a medium with little or no acid. Decay of vegetables or meat is therefore usually due to the action of bacteria. Neither fruit nor acid vegetables are favorable to the growth of most bacteria. The desired fermentation of cucumbers and sauerkraut, however, is caused by bacteria that prefer or tolerate an acid medium, in this respect differing from the bacteria causing spoiling of canned vegetables.

Yeasts, molds, and bacteria are widely distributed, and occur in the air, in water, on fruits and vegetables and in great abundance in soil and dust. Hence at the time of pickling, not only the fruit or vegetable, but also the syrup, or brine, and the containers are more or less heavily contaminated with many kinds of microorganisms.

Methods of Preserving.—The activities of the organisms responsible for spoiling can be prevented either (1) by killing all organisms present, as by heat or other means, and then preventing the entrance of all others; or, (2) by making the conditions so unfavorable to these microorganisms that they cannot grow or do any damage. The first method is that used in canning; the second is that used in pickling.

The salt and vinegar used in pickling and the lactic acid formed by fermentation act as preservatives. They may be used alone or in combination. The manner in which they are used depends on the kind of pickle desired. If salt or vinegar alone is used, a sufficient quantity must be added to completely prevent the growth of all injurious microorganisms.

Lactic Acid Fermentation.—Although the activity of most bacteria is curbed by even a moderate acidity, lactic acid bacteria are capable not only of growing in an acid medium but also of producing lactic acid from sugars.

Many of the vegetables as they come from the field contain on their surface both lactic acid bacteria and organisms capable of causing spoiling.

It is customary to add brine or salt to vegetables to be preserved by lactic acid fermentation, in order to inhibit microorganisms capable of causing spoiling as well as to improve the flavor and texture of the vegetables. Lactic acid bacteria are tolerant of salt and grow readily in its presence. The brine also extracts the vegetable juices and thus aids the required lactic acid fermentation. The lactic acid and the salt preserve the product, provided air is excluded. In the presence of air, however, aerobic microorganisms ("pickle scum")

develop, and destroy the acid so that putrefaction ensues. Exclusion of the air after lactic fermentation is complete, therefore, is an essential part of the process.

Salt Curing of Vegetables for Vinegar Pickles.—To prepare the vegetable tissues to better absorb the vinegar or vinegar syrup, the vegetables should be first stored in strong brine for several weeks or longer. Such short methods as parboiling or over night soaking in brine, or treatment with salt for a few hours, are not recommended. Attempts to use short cuts or to make pickles over night, as is sometimes advised, are based on a mistaken idea of what really constitutes a pickle.

As stated above, storage in brine for at least one month is necessary for the curing of the cucumbers or other vegetables before they are placed in vinegar. Lactic acid fermentation usually occurs with accompanying desirable changes in flavor, color, and texture—in part owing to the fermentation, and in part to the action of the salt. The vegetables lose their "raw" flavor and become crisp; the flesh becomes translucent, i.e., semi-transparent; and the color of the skin changes from green to a dark olive or yellowish green.

After the required period of storage in brine, vegetables to be made into vinegar pickles are removed from the brine and soaked in hot water several hours in order to remove the excess of salt from their tissues. They are then stored in vinegar, which may be plain, spiced, or sweetened and spiced. If sweet pickles are to be made the prepared vegetables should be stored for some time (several weeks) in unsweetened vinegar; this treatment greatly reduces the tendency of the vegetables to shrivel in the sweetened vinegar.

Salting Without Fermentation.—In some cases it is desired that the vegetables be kept in as nearly a fresh condition as possible. This is accomplished by using enough salt or a strong enough brine to completely prevent the growth of microorganisms.

Preservation With Vinegar.—When vinegar is used as a preservative the acetic acid content of the pickles and liquid must be sufficiently high (above 2 per cent acetic acid) to prevent growth of microorganisms other than vinegar bacteria.

MATERIALS AND EQUIPMENT USED IN PICKLING

Salt.—As previously stated, salt is used in pickling for several purposes and in a variety of ways in the preparation of pickles.

Ordinary so-called dairy salt used in flavoring butter is satisfactory for the small-scale preparation of pickles. Table salt is rather too

expensive if large quantities of vegetables are to be preserved. Half-ground or three-quarter ground white rock salt of high quality is also satisfactory and is used generally by commercial producers of pickles. Caked or lumpy salt should not be used for sauerkraut as it cannot be

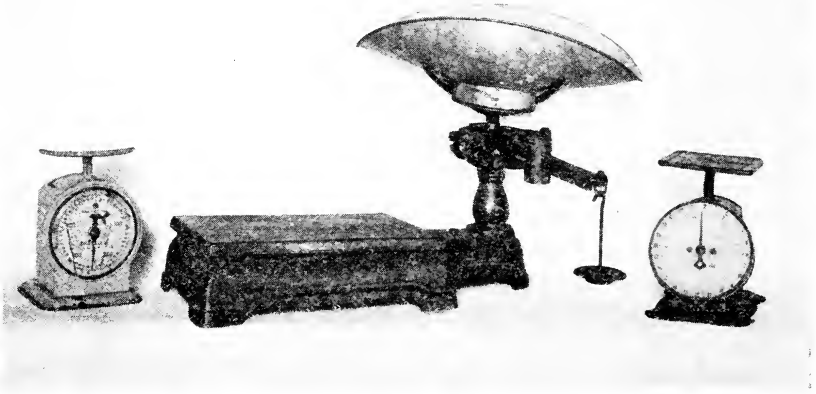

Fig. 1.—Scales for weighing vegetables salt and spices used in pickling.

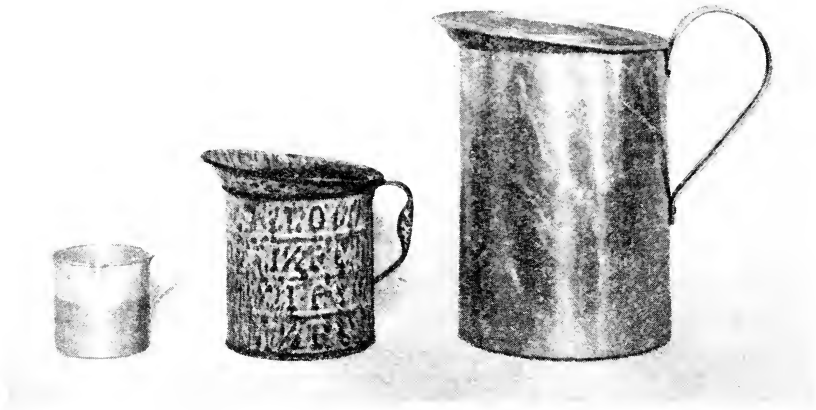

Fig. 2.—Gallon and quart liquid measures and a cup measure.

equally distributed; rather fine salt is required for this product. Salt to which anything has been added to prevent caking is not recommended for pickling and brining. Alkaline impurities in the salt are especially objectionable and the salt should contain less than one per cent of the carbonates of sodium, calcium, or magnesium.

Scales.—In preparing sauerkraut, the salt and sliced cabbage must be weighed accurately; likewise in preparing brine for dill pickles or olives the salt should be weighed and the water measured carefully. A kitchen scale is satisfactory for home use; for commercial operations a platform scale is recommended (see fig. 1).

Measures for Liquids.—For household use a quart measure is very useful: lacking this, a quart fruit jar may be used for measuring water or brine (see fig. 2).

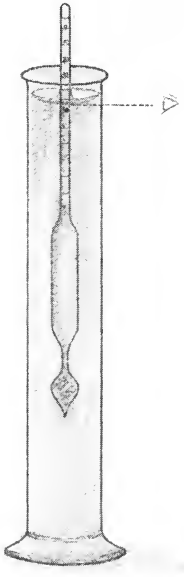

Fig. 3.—Hydrometer floating in hydrometer jar, showing that reading is taken at lower level of the meniscus.

For farm-scale operations a gallon measure, several three or five-gallon buckets whose capacities have been accurately determined by means of a gallon measure, are useful.

Salt Hydrometers.—If large quantities of vegetables are to be brined a hydrometer is recommended as by its use the exact salt content of the brine can be measured; but for home pickling it is not needed. The hydrometer consists of a weighted glass bulb having a long stem with a paper scale, reading in degrees Baumé or in degrees salometer. The depth to which the bulb sinks varies with the salt content of the brine and the length of stem extending above the liquid varies likewise. The reading is taken by floating the hydrometer in a cylinder of the brine and observing the degree at the surface (see fig. 3).

Salt hydrometer scales are of two kinds, Baumé and salometer. The latter scale is the more commonly used in pickling. Although the salometers (also called salinometers) as purchased are marked "Per cent scale of salt at 60° F" they do not actually read in per cent salt directly. Thus a reading of 100° salometer indicates a saturated

TABLE 1

SALT PERCENTAGES; CORRESPONDING BAUMÉ AND SALOMETER READINGS, AND QUANTITY OF SALT REQUIRED FOR ONE GALLON OF WATER

Per cent salt (Also approximately Baumé degrees)	Salometer degree	Ounces salt per gallon
1	3.8	1.3
2	7.6	2.6
3	11.3	4.0
4	15.1	5.3
5	18.9	6.7
6	22.6	8.1
7	26.4	9.6
8	30.2	11.1
9	34.0	12.7
10	37.7	14.2
11	40.5	15.8
12	45.3	17.5
13	49.1	19.1
14	52.8	20.8
15	56.6	22.6
16	60.4	24.4
17	64.2	26.2
18	68.0	28.1
19	71.7	30.0
20	75.5	32.0
21	79.2	34.0
22	83.0	36.1
23	86.8	38.2
24	90.6	40.4
25	94.3	42.7
26.5	100.0	46.1

salt solution, 26½ per cent and not 100 per cent salt; while 40° salometer, as shown in table 1, in approximately 10 per cent salt. The Baumé scale indicates salt per cent directly. Table 1 shows the relation between salometer readings and salt percentages. Degrees Baumé equal per cent salt approximately, and salometer degrees are approximately four times the Baumé degree. Salometers or Baumé hydrometers may be purchased, through a drug store or from a firm dealing in chemical apparatus and supplies, for about $1.00 each. A hydrometer cylinder about 1½ inches × 12 inches is also required. The hydrometers as purchased are liable to be imperfectly made and should preferably be checked against a brine of known salt content.

Vinegar.—Vinegar is a condiment prepared from various sugary or starchy materials by alcoholic and subsequent acetic fermentation. The acid found in vinegar is called acetic acid and it is to its presence that vinegar owes its preservative qualities. The flavor of vinegar is due in a large degree to the product from which it is made. Vinegar made from fruit juices has a fruity flavor and odor.

The leading vinegars are cider, malt, wine and so-called "spirit," "distilled" or "grain" vinegars. The distilled vinegar is made by the acetic acid fermentation of dilute distilled alcohol. It consists almost entirely of a solution of acetic acid and possesses only the pungent flavor and odor of that acid. It has very little other flavor and for this reason is often employed in the preparation of pickles where the fruity or aromatic flavors of other vinegars are not desired. It is also much cheaper than other vinegars and for this reason is used extensively in commercial pickle factories.

A clear vinegar is required for pickles. It should be free from sediment, mother of vinegar, and other solid material. For home pickling, cider vinegar of good quality is satisfactory. For the best results, vinegar used for pickling should be previously aged in wooden containers in order that it may lose the "raw" taste of freshly made vinegar and acquire a desirable aroma and flavor.

Since it is the acetic acid in vinegar that is responsible for the preservation of pickles it is necessary that the vinegar used should not be too low in acidity. The acid content of vinegar is normally expressed in "grains." A "10-grain" vinegar contains 1 per cent of acetic acid and a 40-grain vinegar 4 per cent acid. A vinegar of 40 to 60-grain strength should be used. The use of too strong a vinegar will cause shrivelling in addition to giving too sour a taste.

Sugar.—In making sweet pickles a good grade of granulated cane or beet sugar should be used, although brown sugar is often used in the preparation of certain sweet pickles.

Spices.—The flavor, odor, and appetizing zest of many kinds of pickles are due largely to the spices added to the brine or vinegar. The spices are added for flavoring and in the amounts used probably do not exert any appreciable preservative effect. The kind and amount of spices used will vary with the type and kind of pickle.

Spices should be used in moderation and should not completely conceal the flavor of the fruit or vegetable.

The spices most commonly used with fermented pickles are whole cloves, coriander, black pepper, bay leaves and dill herb. If a

sharper taste is desired, hot red peppers such as cayenne are added. Sometimes cardamom, mustard, ginger, turmeric and horseradish are also used.

For spiced vinegar pickles the spices most commonly used are nutmeg or mace, cloves, allspice, cinnamon, and ginger root. Mustard seed is also sometimes used. In mustard pickles ground mustard in vinegar is used.

All of these spices may be purchased in bulk and mixed as desired or the mixed whole spices can be purchased in most grocery stores. The mixed spices are prepared for use in fermented pickles rather than for spiced vinegar pickles.

It is assumed that the reader is already familiar with the common spices listed above but a brief description of dill herb may prove of use and interest. It is a native of southern Europe, can be grown in nearly all parts of the United States, and usually is obtainable in the markets of large cities. Seed may be obtained and the herb grown in the home garden easily. While the entire stalk of the dill herb is of value for flavoring, the seeds are best suited for this purpose. For this reason the seed panicle should be harvested only after the seeds have become fully mature but before they have become so ripe that they drop. The herb may be used green, dried, brined, or preserved in strong vinegar. When green dill, or that preserved in brine or vinegar, is used, twice as much by weight as would be required of the dried herb is taken. Dill retains its flavor for a long time when brined or placed in vinegar. To preserve it in this way it should be packed in a 15 per cent salt brine, that is approximately 57° salometer, or in 100-grain vinegar. The brine or the vinegar in which the herb is packed can also be used for flavoring.

Water.—Soft water is best for pickling. Hard waters should not be used, especially for use in preparing fermented pickles, as the presence of large quantities of calcium and other salts found in many natural waters may prevent the proper acid formation, thus interfering with normal curing. If present in any appreciable quantity, iron is objectionable, as it causes blackening of the pickles under some conditions.

Coloring and Hardening Agents.—It is the practice in some households to "green" pickles by heating them with vinegar in a copper vessel. In this treatment there is formed copper acetate, which is very poisonous. Foods "greened" with copper salts, all of which are poisonous, are regarded as adulterated and cannot be sold. The use

of green leaves, such as grape leaves, to improve the color of the pickles is of doubtful value and is unnecessary, although many recipes recommend their use.

Alum is often used for the purpose of making pickles firm. If the proper methods are followed in pickling, the salts and acids in the brine will give the desired firmness. Although alum will make pickles crisp, its use is of doubtful expediency. It is not recommended in pickling.

Fig. 4.—Glass-top jars suitable for pickling. Note the position of bail on first jar at left; it is in the correct position for pickles to be fermented in the jar. The bail is clamped to downward position after fermentation, as in the jar next to it.

Cooking Utensils.—In the preparation of cooked unfermented pickles such as pickled peaches it is necessary to use aluminum, or agate, or porcelain lined kettles because of the chemical action of the acid in vinegar on most metals.

Containers.—For home use glass top fruit jars are excellent. The ordinary Mason jar and its various modifications which are covered with a zinc screw cap with a porcelain lining are not desirable because the zinc or other metallic cap is corroded by the vinegar and other acids in the brine. The zinc salts thus formed are poisonous. If a zinc cap is used it is necessary that it be heavily lacquered.

There are several forms of satisfactory glass top jars among them the E-Z seal and the Vacuum Seal (see fig. 4).

Stoneware open jars may also be used for home pickling although they are not so convenient as the glass jars (see fig. 5). The one-

gallon and three-gallon sizes are best for home use. A circular piece of wood should be cut for each jar to act as a float on which a weight is placed to keep the vegetables submerged in the brine. A plate can be used instead of the wooden disc.

Watertight kegs or barrels are best for making larger quantities. They may be had in all sizes from 5 to 100 gallons. The 45-gallon barrel is used commercially in the preparation of dill pickles and may

Fig. 5.—Type of wooden and stoneware containers suitable for brined pickles. Note the 6-inch bungs in top of the wooden kit and barrel.

be used to advantage on the farm for packing vegetables to be salted or fermented in brine. New hardwood barrels or new paraffin-lined spruce barrels with a 6-inch opening in the head are recommended.

If second hand barrels are used they must be treated to remove all undesirable odors and flavors. This may be done by treating them with a solution of one ounce of sal soda or one-half ounce of lye per gallon of water. The barrel should be filled and the solution allowed to remain in the barrel for several days until it smells "sweet." The barrel should then be thoroughly "soaked out" with hot or cold water. If spruce or pine barrels are used they must be lined with paraffin to prevent the pickles acquiring an undesirable taste. Hot water must not be added to paraffined barrels as it will melt the paraffin.

KINDS OF PICKLES

Pickles are classified largely according to the method of preparation or preservation:

Pickles preserved by the use of salt.

a) Dill pickles. Fermented in added brine.

b) Sauerkraut. Fermented in brine produced by dry salting.

c) Vegetables preserved without fermentation by the addition of a large amount of salt or a heavy brine.

Pickles preserved by the use of vinegar.

a) Sour pickles.

b) Sweet pickles.

c) Spiced unsweetened pickles.

d) Mustard pickles.

Pickles may be further classified as follows:

a) Mixed pickles. Consist of two or more vegetables packed in the same container.

b) Relishes. Consist of finely mixed chopped vegetables.

c) "Mangoes"—are stuffed pickles.

d) Catsup, chutney and sauces. Consist of spiced, cooked, and strained tomatoes or fruit.

Only vegetable pickles are preserved by salt. Fruit pickles are generally preserved in a sweetened spiced vinegar. Olives, however, are an exception. The preparation of olive pickles is described in a separate section.

PREPARATION OF FERMENTED PICKLES

Fermented vegetables owe their keeping quality mainly to lactic acid. For this reason it is necessary to pack the product under conditions which are most favorable to the lactic acid bacteria and unfavorable to microorganisms capable of spoiling the product. The home preparation of fermented pickles such as sauerkraut and dill pickles will not be successful unless the following conditions are carefully maintained.

1. Air should be excluded from the brined vegetable before, during, and after fermentation. The exclusion of air will prevent the growth of spoilage organisms that require air for growth. This is done by keeping the containers full and the pickles well covered with brine at all times. After fermentation is complete the pickles should be sealed to exclude air.

2. A suitable and fairly uniform temperature for fermentation should be maintained. A temperature of 70–80° F is recommended.

3. The salt content of the brine should be high enough to inhibit the growth of spoilage organisms but not high enough to inhibit lactic acid fermentation. The salt content of the brine at the time it is added to the vegetables should not be below 8 per cent salt.

4. A small amount of vinegar should be added to the brine used for dill pickles to favor fermentation and inhibit the spoiling organisms in the first stages of fermentation.

Fig. 6.—Shredding machines and knives suitable for shredding cabbage for sauerkraut.

5. If the storage container cannot be sealed to exclude air, a "pickle scum" will form. This scum should be removed frequently or the pickles will spoil.

The precautions given above and the general principles discussed earlier in this circular should be observed in carrying out the following directions.

Directions for Making Sauerkraut.—a) Use fully matured solid heads of cabbage of good quality.

b) Remove the outer green leaves and discard all decayed or bruised leaves.

c) Quarter the heads and slice off the core portion.

d) Shred the cabbage into narrow strips by means of a hand shredding machine, slaw cutter, or large knife (see fig. 6).

e) Weigh the sliced cabbage and salt; use one pound of salt for every 40 pounds of cabbage.

f) Distribute the salt evenly with the cabbage and mix very thoroughly.

g) Pack the cabbage close (but not too tight) in the jar or keg.

h) Cover when full with a clean cloth and a circular wooden false head or plate.

i) Place a heavy stone or brick on the cover. The weight must be heavy enough to cause the brine formed later to cover the false head. Do not use lime stone as it will dissolve in the brine and will neutralize the acid of the sauerkraut.

j) Leave in a warm place. The juice of the cabbage dissolves the salt and forms a brine in which fermentation soon begins with considerable foaming.

k) If kept at 75–85° F the fermentation should be completed in eight to twelve days. At lower temperatures it may require two to six weeks. However, after about three weeks at favorable temperature the kraut should have the desired flavor.

l) Remove all scum as it appears; if allowed to remain it will destroy the lactic acid and cause spoiling.

m) When fermentation ceases and the sauerkraut has developed the proper flavor it must be sealed in some manner to exclude air so that "scum" cannot form and cause spoiling. This can be done by covering with a layer of melted paraffin. Another method is to heat the sauerkraut to boiling and pack boiling hot in sterilized jars. A better flavor will be developed if the brine alone is boiled and poured boiling hot on the sauerkraut packed in jars.

Directions for Making Dill Pickles.—a) Use cucumbers of medium size, freshly picked. Have at hand mixed dill spices and dill herb. A total of about 1 quart of mixed dill spice is used for a 50-gallon barrel of pickles or about 3 fluid ounces for a 5-gallon barrel. The spice mixture consists of approximately equal weights of whole cloves, coriander and black pepper and about 1 ounce of dry bay leaves for each 15 ounces of the mixed whole spices. A total of 6–8 pounds of green or salted dill herb or 3–4 pounds of the dry plant is used for each 50 gallons of pickles; or about ¾ pound of the green or salted or about six ounces of the dry to a 5-gallon barrel.

b) Wash the cucumbers and drain off surplus water.

c) Place a layer of dill herb in the bottom of the jar or keg. Pack the cucumbers in a glass-top fruit jar or wooden keg. If a keg is used loosen the hoop at one end and remove the head; or, if the keg or

barrel has a large opening it will not be necessary to remove the head. Fill with cucumbers and as it is being filled add the dill herb and the mixed spices.

d) Add a brine made up of one-half pint vinegar and ¾ pound of salt per gallon of water; or, if a large volume of brine is required make it to test 9½° Baumé or 36° salometer. In open containers, the brine must cover the vegetables completely. If a glass-top jar is used fill with brine and leave the bail of the lid in the half closed position so that gas formed during fermentation can escape (see jar at the left in fig. 4). If a keg is used, the head, removed to permit filling, is returned to place and the hoops tightened before adding the brine. The keg is then filled with brine through the bung hole and the bung is driven in tight.

e) Place the fermentation containers (jars, barrels, or kegs) in a warm place. If kegs or barrels are used they may be stored in the sun which warms the staves and these in turn the contents. Do not store glass jars in the sun as the light will kill the lactic bacteria. Dill pickles cure slowly; usually two or three months is necessary before they acquire the desired color, texture and flavor. Replace the brine lost during fermentation and storage at frequent intervals. The jars or kegs must be kept filled with brine at all times. If stoneware jars or other open containers are used see that the false head is at all times covered with at least two inches of brine. Remove all scum as rapidly as it forms in such containers. Seal with paraffin when gas formation ceases. It is very difficult to make good dill pickles in open jars; a sealed keg or barrel is much better. Lacking this the glass-top jar is recommended.

f) If the pickles are being made in open jars it is best to pack them in glass-top jars after the fermentation is nearly complete. If jars are not available, cover the surface of the liquid with paraffin to prevent spoiling by "scum" and mold. **If at any time the pickles become soft and slimy and develop a disagreeable odor, discard them!**

Directions for Making Other Vegetable Pickles.—Certain other vegetables may be preserved as described for dill pickles but the spices are usually omitted. This method is not recommended however for string beans, peas, corn, asparagus, and spinach, owing to the danger from Botulinus poisoning, in case too weak a brine is used or if the vegetables are allowed to spoil because of improper storage. It can be used for peppers, green tomatoes, cauliflower, Brussels sprouts, and artichokes.

a) Prepare green tomatoes, peppers, and sprouts by washing, sorting and draining. Cut cauliflower from the head and trim artichokes to the edible "heart," discarding the outer inedible "leaves" or bracts.

b) Prepare a brine of ½ pint of vinegar and 12 ounces (¾ pound) of salt per gallon of water.

c) Proceed as directed for dill pickles.

d) In preparing the vegetables for the table, after fermentation, parboil them in fresh water 3–4 minutes to remove excess salt. Discard this water. Cook until tender in fresh water.

PRESERVATION OF VEGETABLES BY SALT WITHOUT FERMENTATION

Vegetables can be preserved with more or less of their fresh flavor and color by means of a sufficient quantity of dry salt or a sufficiently strong brine to prevent the growth of microorganisms. This method is recommended in preference to the fermentation method for vegetables that are apt to become poisonous by growth of Bacillus botulinous in low concentrations of salt. String beans, corn, peas, and spinach can be preserved in this manner. Asparagus, however, shrivels and toughens and does not keep well by any method of salting.

Vegetables preserved without fermentation should be stored in a cool place to minimize their tendency to spoil. They should also be sealed in order to reduce drying by loss of water.

Dry salt.—a) Prepare the vegetables as for cooking for the table. Corn should be parboiled on the cob to "set the milk" and should then be cut from the cob. Snip string beans and cut to proper length. Slice cucumbers. Wash spinach or chard. Slice cabbage.

b) Weigh, and for each 4 pounds of vegetables use 1 pound of salt.

c) Mix well in a stoneware jar. Cover with a wooden cover or plate and place thereon a heavy weight as in making sauerkraut. A heavy brine forms within a few days. In order to prevent drying, cover the brine with melted paraffin; or transfer vegetables and brine to fruit jars and seal.

d) In preparing the salted vegetables for the table later, remove the excess of salt by soaking in several changes of water and then cook in same way as fresh vegetables. Cucumbers need only be soaked in water, and then in dilute vinegar, and used in salad in the same way as when fresh.

Strong Brine.—Whole peppers, onions, and cucumbers as well as string beans, corn on the cob and other vegetables can be preserved in a strong brine, the same general principles being used as in dry salting. **CAUTION: the directions must be followed closely in using this method, or there will be danger of botulinus poisoning!**

a) Prepare a saturated salt solution by dissolving 3 pounds of salt and one pint of vinegar in 1 gallon of water.

b) Put the weighed vegetables into a stoneware jar and add, for each pound of vegetables, at least 1 pint of brine; if less brine is used the juices of the vegetables will so dilute the brine that the vegetables may spoil. Keep the vegetables under the brine by means of a wooden cover or plate and weight—they float when first put into the brine. Seal with paraffin. Instead of an open jar the brine and vegetables may be packed in air tight sealed fruit jars.

VEGETABLE PICKLES IN VINEGAR

Curing vegetables in brine rather than preparing them by parboiling before adding vinegar, is recommended. The following procedure is based on the brine curing process.

Preparing Salt Stock for Use in Vinegar Pickles.—a) Choose small cucumbers, onions, or other suitable pickling vegetables.

b) Pack in a jar, stoneware crock, keg or barrel.

c) Cover with a 10–12 per cent brine (1 pound salt per gallon of water).

d) Add more salt at the rate of 1 pound for every 10 pounds of vegetables, making certain it dissolves.

e) Cover with a wooden float or plate and weight the vegetables below the brine.

f) At the end of the first week and at the end of each succeeding week for five weeks add ¼ pound of salt per 10 pounds of vegetables. In adding salt always place it in the liquid above the weighted cover. If it is added directly to the brine, below the cover it may sink, and as a result the salt solution at the bottom will be very strong, while that near the surface may be so weak that the pickles will spoil.

g) Remove the scum as formed and after the fifth week seal the container with paraffin, or otherwise as directed. String beans, green tomatoes, beets, chayotes, burr gherkins, may be well preserved in this manner.

h) Onions, cauliflower and peppers are best prepared by placing the vegetables in a stronger brine, one of 1½ pounds of salt per gallon of water. Store for four to six weeks or longer, keeping them submerged in the brine, before use in preparing sour pickles.

Preparation of Sour Pickles from Salt Stock.—The predominating flavor of the sour pickles is due to the vinegar which is also the preserving agent. Before adding the vinegar the salt cured vegetables, as previously stated, must first be processed in water to remove the excess of salt. Unless otherwise stated the vinegar to be used is cider vinegar. Spices may be added if desired. Pickles should be cooked in an enamel-lined or aluminum kettle and stirred with a wooden spoon. Iron kettles and spoons discolor the pickle and are often affected by acid.

a) Remove the vegetables from the brine and heat them in a large amount of water to the simmering point for about twenty minutes. Discard this water; cover with fresh water. Heat again to the simmering point, remove from the stove and let stand about two or three hours to soak out the excess salt. If still very salty repeat the process. In this processing the salt is largely, but not completely, removed. Pickles keep better when a small amount of salt is left.

b) After processing, the pickles should be drained and sorted. To secure the most attractive product, the pickles should be as nearly of uniform size as possible.

c) Cover the pickles with vinegar. An ordinary 45 or 50-grain cider vinegar usually gives as sour a taste as is desired. If very sour pickles are preferred, store first in a 45-grain vinegar, for a week or ten days and then transfer to a fresh vinegar of the strength desired. When one application only of vinegar is used it may be necessary to replace it with fresh vinegar after a few weeks as the water in the pickles dilutes the acid greatly, and may permit mold growth or softening by bacteria. The pickles will keep better if sealed.

SPICED SOUR PICKLES

If spiced pickles are desired take vinegar and spices in the following porportions to each two pounds of cucumbers or other vegetables:

1 ounce stick cinnamon	½ ounce dried ginger root
½ ounce whole cloves	6 cups vinegar

Heat the vinegar and spices together at the simmering point for five minutes and set aside over night. Then strain to remove the spices and pour the liquid over the drained cucumbers packed in glass top jars. Seal.

SWEET VEGETABLE PICKLES

As with sour pickles, better sweet pickles are obtained by using vegetables previously cured in brine than by using fresh vegetables.

a) Process the brined vegetables in hot water to remove salt as directed for sour pickles. Prick the prepared vegetables through and through in several places. A silver table fork may be used for this purpose. Unless cucumbers are punctured in this way, the sweet vinegar may cause shrivelling.

b) Store the pickles in strong unsweetened vinegar for one week. Then drain and use the vinegar for spicing as follows:

c) Prepare a syrup of:

3 pints vinegar drained from the pickles.
2 pounds sugar; brown sugar is preferred.
1 tablespoon each of mace, ginger root and whole cloves.
2 tablespoons stick cinnamon.

Boil the vinegar and spices together slowly for about five minutes and let stand over night. Strain to remove spices. Return the spiced vinegar to the pickles. Seal.

SWEET FRUIT PICKLES

If the fruits are not to be peeled, puncture them thoroughly with a silver fork or in some other way to permit the syrup to penetrate without causing shrivelling. Peaches should be peeled; small clingstone peaches are best for the purpose. Pears also should be peeled unless small Seckel pears are used. Apricots and plums are used whole.

a) Prepare the following syrup:

1 pound sugar.
2 pints water.
1 pint vinegar.
1 tablespoon ginger
1 teaspoon cinnamon.
1½ tablespoons whole cloves.
2 tablespoons stick cinnamon.

b) Place the fruit in the syrup and cook slowly until tender. Soft fruits, such as grapes, require very little cooking.

c) Pack boiling hot into scalded glass top jars and seal at once.

MIXED PICKLES

Mixed pickles as the term is used here consist of cucumbers with one or more other vegetables such as onions, cauliflower, green peppers, green tomatoes, and beans. Mixed pickles can be prepared from the salt cured or green vegetables in the form of a sweet or sour pickle or they can be prepared by fermenting more than one kind of vegetable together as in preparing dill pickles. The recipes previously given are followed in making mixed pickles from salt stock.

COOKED VEGETABLE PICKLES

It is customary to cook beets before making them into pickles. Certain other vegetables such as artichokes, string beans, and asparagus may be prepared in a similar manner. The process usually consists in cooking in water or dilute brine until tender and storing the drained, cooked vegetable in salted vinegar or in a mixture of strong brine and vinegar. In order to avoid danger of poisonous spoiling the brine must contain enough salt and vinegar to prevent growth of *Bacillus botulinus*. For most vegetables, the brine should be made of 1 quart of water, 1 quart of strong vinegar and ½ pound of salt.

The vegetables may be sealed in glass-top jars with the brine—vinegar mixture; but in so doing the jars must be filled only loosely with vegetables so that there will be space for sufficient solution to preserve the vegetables and prevent poisonous spoilage. As an added precaution it is recommended that vegetables so preserved be boiled for 10 minutes in fresh water before serving. It is recommended that cooked vegetable pickles be prepared only for serving within 24–36 hours after preparation.

RELISHES

Relishes consist of mixed chopped vegetables and spices with or without mustard dressing. Better results are obtained by the use of salt stock vegetables than by the use of fresh, but in the home it is usually more convenient to use the latter. The number of published recipes for making relishes are very numerous and only those for a few of the more popular ones will be given here.

Preparation of Chow Chow.[3]—*a*) Cut into moderate sized pieces:

3 pounds small cucumbers
3 pounds button onions
3 pounds small green tomatoes
3 pounds string beans
2 large cauliflowers
6 green peppers, mild
3 sweet red peppers (hot peppers if desired)
1 bunch celery

b) Remove the seeds from the sliced peppers. Sprinkle with 1 cupful of salt and add enough water to cover. Let stand 24 hours. Treat the sliced onions similarly in a separate dish.

c) Drain the brine from the onions and peppers and add about 2 quarts of water to this brine. Parboil all the vegetables in this diluted brine about 5 minutes. Drain and discard the liquid.

[3] This product differs considerably from commercially made chow chow. Recipe from Connecticut Agricultural College Emergency Food Series **21**:4. 1918.

d) Make a paste by mixing ¼ pound mustard, 2 tablespoons turmeric, 3 cups sugar, 2 cups flour, with a little cold cider vinegar; bring to a boil enough more vinegar to make a total of four quarts, and add to the paste.

e) Stir for a few minutes to a smooth consistency, then pour over the drained vegetables and cook slowly on the back of the stove for 20 minutes. Pack scalding hot in jars and seal.

Preparation of Piccalilli.[4]—Use 12 pounds of green tomatoes, 2 or 3 green sweet peppers and 2 hot peppers. These are then coarsely chopped or sliced. Sprinkle the cut tomatoes and peppers with 1 pint of salt, and cover with water and allow to soak over night. Drain thoroughly, heat until tender in the following mixture:

- 3 quarts vinegar
- 4 cups sugar
- 1 teaspoon ground ginger
- 1 teaspoon ground cinnamon
- 2 tablespoons mustard (seed or ground)

Add 1 cup grated horseradish uncooked. Pack in glass-top jars hot, and seal. Allspice, cloves and 1½ pounds of sliced onions may be added to the recipe if desired, the onions being treated in the same manner as the other vegetables.

Preparation of Ripe Cucumber Relish (Amber Relish."[5]—Take the following ingredients:

- 12 ripe cucumbers
- 6 white onions
- 1 quart vinegar
- ¼ teaspoon cinnamon
- ½ cup of salt
- 2 cups sugar
- 1 teaspoon white mustard seed
- 1 teaspoon ground mustard
- ¼ teaspoon ground cloves
- 1 tablespoon turmeric powder

Peel and chop the cucumbers and onions. Add ½ cup of salt and water to cover. Let stand one hour and drain off the brine. Boil vinegar, sugar and spices (tied in a bag) together for 20 minutes. Add the vegetables to the prepared vinegar and cook slowly until tender and all the ingredients have become yellow in color. Pack hot in glass-top jars and seal.

Preparation of Mustard Pickles.[6]—*a*) Use the following:

- 2 quarts medium-sized cucumbers in thick slices
- 1 quart very small white onions (whole)
- 1 quart cauliflower—finely cut
- 6 green peppers—chopped coarse
- 2 cups carrots—chopped coarse

b) Soak each vegetable separately two hours in a brine of ½ cup salt to 1 quart water. Drain thoroughly. Cook until tender in lightly salted water.

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[4] This product differs considerably from commercially made piccalilli. Recipe from: Pancoast, Carrie L. Pickles and relishes. Missouri Agr. Ext. Service Cir. 35:1–4. 1917.

[5] Brokaw, W. H. Pickles and relishes. Nebraska Agr. Ext. Service Food Preservation Cir. 4:1–6. (Mimeo.)

[6] Recipe by Carrie L. Pancoast. Citation in footnote 4.

c) Drain again, then add the following mixture which has been cooked in a double boiler until fairly thick:

3 quarts vinegar
1 cup of ground white mustard
3 cups sugar
¼ teaspoon turmeric powder
1 cup flour mixed to a paste with ½ cup water

d) This mixture should be added hot and the vegetables sealed at once in glass-top jars. Green string beans and celery may be added if desired. Cabbage may be substituted for cauliflower.

Preparation of Dixie Relish.[7]—Use the following:

1 quart chopped cabbage
1 pint chopped white onions
1 pint sweet red peppers
1 pint sweet green peppers
4 tablespoons mustard seed, whole
2 tablespoons celery seed (crushed)
½ cup sugar
1 quart strong cider vinegar
5 tablespoons salt

Soak the chopped peppers in brine (1 cup of salt to 1 gallon of water), for 24 hours. Freshen in cold water for 1–2 hours. Drain well. Remove seeds and coarse white pulp. All ingredients should be chopped separately and then well mixed. Let stand overnight covered in a crock or enameled vessel. Pack in small glass-top jars as follows: drain off the vinegar; pack the relish into jars, not filling them completely; add the vinegar to fill; with a wooden paddle or silver-spoon handle press the relish to remove all air bubbles.

e) Garnish each jar with two strips of red pepper placed vertically on opposite sides of the jar.

f) Place rubbers on jars and put lids on loosely. Place jars in a wash-boiler sterilizer with water half way up the sides of the jars. Heat the water to boiling and boil for 10 minutes. Remove and seal.

CATSUPS AND SAUCES

Tomato catsup, chili sauce and chutney differ considerably in texture and appearance from pickles but are used in much the same way as relishes.

Preparation of Chili Sauce.[8]—*a*) Take:

3 pounds ripe tomatoes (peeled)
4 green sweet peppers
4 tablespoonfuls brown sugar
1 hot pepper
4 onions
1 tablespoon ginger—ground
½ tablespoon nutneg—ground
2 tablespoons salt
1 teaspoon cinnamon—ground

b) Chop the vegetables, add the other ingredients and cook until tender and of the proper consistency. Then add 3 cups vinegar, boil 5 minutes and seal hot in glass top jars.

[7] Cruess, W. V. Home and farm food preservation. Macmillan Company. p. 230. 1925.

[8] Recipe by Carrie L. Pancoast. Citation in footnote 4.

Preparation of Tomato Catsup.[9]—*a*) Select sound, smooth, evenly-ripened tomatoes of deep red color, firm flesh and good flavor. Do not use unripe tomatoes.

b) Remove green or unsound parts.

c) Wash in water and drain thoroughly.

d) Crush the tomatoes thoroughly and transfer to a large aluminum pot and boil about three minutes.

e) Rub the pulp through a colander or sieve to remove seeds and skins.

f) For each 3 gallons of this unconcentrated raw tomato pulp use:

¼ pound peeled and chopped onions
1 clove of garlic peeled and chopped
1 level tablespoon whole cloves
1 rounded tablespoon whole cinnamon
1 tablespoon whole allspice
1 level teaspoon ground cayenne pepper
1 level teaspoon whole mace (not ground)
1⅛ pound sugar
5 ounces salt
1½ pints strong cider vinegar

g) Place the spices, onion and garlic, in a small cheese cloth bag. Tie the mouth of the bag and place it in 3 gallons of the tomato pulp. Add the cayenne pepper direct.

h) Concentrate rapidly by boiling, with constant stirring, to approximately one gallon.

i) Dissolve the sugar and salt in the vinegar and add the solution to the hot pureé.

j) Stir thoroughly, heat to boiling, remove the bag of spices.

k) Pour boiling hot into sterilized glass-top jars and seal at once. Or if a bottle capper is available pour into catsup bottles and seal at once with beer caps. Turn the capped bottles upside down to cool.

l) This recipe is sometimes varied by extracting the spices with the vinegar and adding the spiced vinegar as in (*i*).

Preparation of Chutney.[10]—Chutneys are hot sweet relishes, which originated in India where many local varieties are made. The basis of all is the tropical mango but they differ very much in the spices used and in their piquancy and sweetness. There are a number of other condiments made that belong to the chutney class of relishes. In California apples, plums, peaches or apricots may be used.

a) Apple chutney:

12 medium size sour apples
6 green tomatoes
1 cup large raisins
2 tablespoons mustard seed
2 cups sugar
4 small onions (white)
1 quart vinegar
2 tablespoons salt

[9] Cruess, W. V., and A. W. Christie. Laboratory manual of fruit and vegetable products. McGraw-Hill Book Co. p. 33. 1922.

[10] Recipe from Nebraska Agricultural Extension Service. Citation in footnote 5.

Cube the apples, and chop the tomatoes, onions and green peppers. Mix with the other ingredients. Cook slowly ½ to ¾ of an hour. Put through a colander. Heat to boiling. Pack hot in glass-top jars. Seal.

b) With other fruits: Other fruits in season may be used instead of apples and the tomatoes may be replaced with fruit.

CUCUMBER CHIPS OR "BREAD AND BUTTER PICKLES"

Recently a type of cucumber pickle known as the "bread and butter" pickle has appeared on the market and has found great favor. This pickle differs from the ordinary cucumber pickle in that it is not made from cucumbers which have previously undergone a lactic acid fermentation in brine. Fresh green cucumbers are used in its preparation. The cucumbers are washed, graded and uniformly sliced cross-wise. The round cucumber chips so obtained are packed in a sweet spiced vinegar in glass jars generally with a few pieces of onion. The "bread and butter" pickle owes its attraction to its delicious crispness and care must be taken in preparation to avoid too long heating as this will destroy the crispness and make the chips "mushy." The following directions were obtained through the courtesy of Mr. C. F. Roberts, general manager of the California Conserving Co. at Hayward.

a) Use fresh green cucumbers and a few onions.

b) Wash the cucumbers and peel and wash the onions.

c) Cut the cucumbers and onions into coarse slices, crosswise.

d) Prepare a light brine by dissolving ½ pound of salt in one gallon of water.

e) Cover the cucumbers and the onions separately with this brine and let stand over night and then drain thoroughly.

f) Make a liquor of equal volumes of vinegar and water and use to scald the pickles about ten minutes, or until they are tender. Be careful not to get them too soft. Drain this liquor off thoroughly. Do not use it again.

g) Dissolve 6 pounds brown sugar in a mixture of 1 quart water and 3 quarts vinegar. Then add the following spices: 1 tablespoon celery seed, 1 tablespoon mustard seed, and 1 tablespoon ground turmeric.

h) Pack the drained pickles in glass-top jars.

i) Bring the vinegar and spices to a boil and pour hot over the pickles and seal.

PICKLED WALNUTS

Pickled walnuts are popular in European countries although seldom made in America. The whole nuts should be picked after they have become about two-thirds grown but before the shell has begun to harden. It should be possible to pierce them through easily with a hat pin; that is the shell must still be soft. As they are intensely astringent ("puckery") a rather prolonged curing process is needed to render them edible.

Recipe 1: To 3 pints vinegar add 1 ounce salt and ½ ounce each of allspice, whole pepper, cloves and ginger. Puncture the walnuts with a fork and store the walnuts in this vinegar four months. Drain. Prepare a fresh spiced vinegar as above and bring to boiling. Pour hot on the nuts. Seal. Store three weeks. They are then ready for use.

Instead of the first vinegar the walnuts may be stored in sealed jars in a brine of 1 pound of salt to 6 pints of water for two months. Then soak in hot water for several hours to remove excess salt. Then place in the final hot spiced vinegar as directed above.

Recipe 2: (*English Recipe.*[11])—Use green English walnuts soft enough so that a hat pin can be pushed through the stone. Put into a strong brine (1 pound of salt to 6 pints of water) for seven days stirring frequently. Drain and dry in the sun until skin commences to shrivel. Pour over them the best vinegar boiled with pickling spices (peppers, cloves, mace, capsicum, ginger, etc.) and seal.

OLIVE PICKLES

The pickling of olives for the market requires considerable experience as different varieties of olives behave differently during pickling and many other factors learned only by experience affect the quality of the product. Nevertheless satisfactory products for home use can be made without previous experience. The accompanying recipes are for beginners, not for experienced commercial olive picklers.

There are three main classes of pickled olives on the market and in general use in California. These are California ripe process olives, Spanish process green olives, and Greek process salted olives. Brief directions for preparing each will be given.

[11] Recipe kindly furnished by F. T. Bioletti.

State Board of Health Regulations.—Ripe olives to be offered for sale must either be packed in hermetically sealed cans or jars and sterilized at 240° F for 60 minutes under supervision of the State Board of Health; or, if not so sterilized must be stored and packed for sale in a brine testing at time of sale not less than 10 per cent salt (10° Baumé or 40° salometer). Unsterilized olives in dilute brine will spoil and may become poisonous; hence the necessity of the above regulations, which is in effect a law.

Preparation of Ripe Olives.—a) The fruit: Use firm freshly picked olives ranging from the straw yellow to light pink stage of maturity. Black olives are too ripe and will usually give a soft pickled product. The Mission and Manzanillo varieties are best for the beginner; the Ascolano and Sevillano are very difficult to pickle successfully by the ripe process.

b) Container: To hold the olives during pickling, use a stoneware crock (jar) or a wooden tub. A barrel cut in half makes two suitable pickling tubs.

c) First lye: Prepare a lye solution (sodium hydroxide) containing about 2 ounces of ordinary flake or granular lye to each gallon of water; this lye is often sold under such names as Rex, Red Seal or Babbit's granulated lye or caustic soda, etc. A convenient method of preparing the solution is to note the contents of the can (usually 12 ounces) and add contents to the required amount of water. A household spring scale is useful for weighing lye but is not necessary. When the lye is well dissolved in the required amount of water, add enough of the liquid to the olives to cover them well.

Stir once an hour and occasionally cut several olives with a knife and note the penetration of the lye; as the lye enters the olive the flesh is turned to a yellowish color.

Allow the lye to remain until the skins of all the olives are well penetrated and the lye has entered the flesh to a depth of about $\frac{1}{32}$ inch or less. The time required varies with the temperature, the variety and lye concentration. Usually 4 to 5 hours is required. The purpose of the first lye is to facilitate the darkening of the olives; if the lye penetrates too deep the color will fail to darken properly.

When the desired penetration has been attained remove and discard the lye solution.

d) Darkening of color: Rinse the olives once with water, and discard the water. Leave them in the crock or tub exposed to the air to darken. Stir twice a day by covering with water and stirring in water. Discard the water each time. Let stand 4 days, stirring regularly as directed.

e) Second lye: Prepare a new lye solution of 1 ounce of lye per gallon. Cover the olives with it and allow to penetrate about halfway to the pit. This will require about 3 or 4 hours. Remove the lye and discard it. This lye is also to facilitate the darkening.

f) Second exposure: Rinse once in water and expose to the air for 24 hours, stirring occasionally during this exposure.

g) Third lye: Prepare another lye solution of 1 ounce of lye per gallon. Place on the olives and allow to penetrate to the pit—about 4 to 6 hours is usually required. The purpose of this lye is to destroy the natural olive bitterness and must be allowed to completely reach the pit. This is judged by cutting several olives with a knife and noting depth of penetration. If the lye fails to reach the pits in 15 hours prepare and apply a fresh lye of ¾ ounce of lye per gallon until it reaches the pits.

h) Third exposure: Rinse olives in water and expose 24 hours to still further darken the color.

i) Washing: Then cover with water. Change the water twice a day for a week. The olives should now be free of taste of lye. Absence of lye or its presence in the olives is easily detected by taste, the amount present is harmless to the taster.

j) Brining: Prepare a brine of about ¼ pound of salt per gallon (that is 4 ounces per gallon or 1 pound to 4 gallons of water). Cover the olives with this brine for 2 days. They are then ready to serve.

k) Storage: To keep the olives for several weeks replace after 1 week this brine with a fresh brine of 8 ounces of salt to the gallon of water (that is 1 pound to 2 gallons of water). Store in this brine one week. Replace it with a fresh brine of 12 ounces of salt to the gallon (that is 3 pounds of salt to 4 gallons of water). Change this brine once every three weeks until the olives are consumed, each time preparing a fresh brine of 3 pounds salt to 4 gallons of water (or ¾ pound to the gallon).

The olives will shrivel somewhat in this brine and are too salty to eat. Therefore, soak the olives in water overnight before serving. *A weaker brine than the above is extremely dangerous, even if the olives are stored in open containers. Take no chances—use the brine as directed.*

Home canning of olives is difficult and is not recommended. When olives are to be offered for sale a permit from the State Board of Health, San Francisco office, is necessary. If a grower wishes to can olives for sale it is recommended that he have them canned under

State Board of Health inspection in the nearest olive cannery. Canning on the farm is not practicable because of the very high cost of the necessary equipment; and because of necessity of State Board of Health inspection.

If you plan to sell pickled ripe olives write to the Secretary of the State Board of Health, San Francisco, for a copy of the regulations governing the canning and sale of olives.

Ripe Olives Short Process.—If a dark color is not considered essential the olives can be pickled in a simpler manner than that given in the above recipe.

Prepare a lye solution of 2½ ounces of lye per gallon. Place it on the olives and allow it to go completely to the pits; this will usually take 8 to 12 hours. Discard the lye. Cover olives with water. Change it three times a day until the olives are free from lye. Preserve in brine as directed in the first recipe.

The olives pickled in this way are usually of better flavor than those pickled by the first recipe but are uneven and light in color, usually yellow to gray.

Preparation of Spanish Process Green Olives.—Green olives are pickled by fermentation in brine in much the same manner as cucumber pickles.

a) Use olives that have reached full size but which are still green to straw yellow in color. Sevillano and Manzanillo varieties are best. The Ascolano and Mission usually do not ferment satisfactorily.

b) Prepare a lye solution of 2½ ounces of lye to the gallon of water. This is equivalent to about three-fourths of a pound to 5 gallons of water. Be sure that the lye has dissolved. Stir well before using.

c) Cover the olives with this lye solution in a wooden tub or stoneware jar and allow it to stand, with occasional stirring, until the lye has penetrated about one-half or two-thirds of the way to the pit. Cut samples of the olives frequently with a knife to observe the depth of penetration of the lye. Penetration to the depth given requires ordinarily 5 to 7 hours.

d) Discard the lye. Cover the olives immediately with cold water. Pour this water off and replace it at once with fresh cold water. Change this water four or five times a day for two days.

e) Place the olives in a barrel or small keg and fill the container completely with brine containing 1 pound of salt to each gallon of water. Also add about 1 pint of imported Spanish olives and brine, and ½ pint of corn syrup, to each 5-gallon keg or larger container. Mix well.

f) Seal the container completely except for a quarter-inch opening to allow escape of gas. When gas evolution has ceased seal the small opening. Keep the barrel filled with brine at all times. The brine used for filling should be 7½ per cent salt, that is 30° salometer or 10 ounces of salt to the gallon of water. If the barrel is stored in a warm room the olives should be ready for consumption at the end of about six months. When the barrel is opened, add to each 5 gallons of olives about 1 quart of vinegar. Transfer the olives and brine to glass-top jars and seal. *Do not use zinc top jars.* No further treatment is necessary.

Preparation of Greek Olives.—a) Use black ripe olives of Mission or Manzanillo varieties. The Sevillano and Ascolano varieties are not suitable because deficient in oil. Obtain a supply of three-quarter or half ground rock salt of good quality; this is a medium coarse crushed salt; ice cream salt will do.

b) For containers use lug boxes, either 50 pound or 25 pound size, lined with ordinary burlap. Mix 5 pounds of the salt with each 20 pounds of olives in the box.

c) Once a week stir well; this can be done by pouring the olives into another box. Brine forms and is allowed to seep away from the box.

d) After about 6 weeks the olives should be ready to use. They will be somewhat shriveled and will have lost most of their bitterness.

To keep them, add a few handfuls of the coarse, crushed salt and stir the olives occasionally. They should be eaten before they have completely dried or molded.

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